The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Training Industrial Chemists

THE youthful chemist and chemical engineer are the most important raw materials of the chemical industry. That industry is occupied in producing finished articles of commerce, often substances of great purity and considerable value, from raw materials which physically bear little or no relationship to the finished product. That statement would apply equally to the human raw material of the industry, and it is from the success of its treatment of the human raw material that the value and prosperity of the chemical industry must ultimately spring. When the final word is said, however much we may make use of machinery, automatic control and the numberless other mechanical devices which are now utilised in industry, the basic fact remains that the success of an industry depends ultimately on the quality of the human brains and the characteristics of the folk who are engaged in that industry.

It was, therefore, with considerable interest that we read in the current number of *The Chemical Practitioner* an account of a discussion which took place earlier in the year on the question of whether present university education is not too academic to meet the needs of industrial chemists. If the answer to that question be in the affirmative and a more "industrial" training for chemists is recommended, the difficulty must be faced that the universities would have to offer two separate courses. One of these would be for the academic chemists and one for the industrial chemists. Quite frequently a man does not know whether he is to be an industrial chemist or not until after he has taken his degree. It has been recorded that for every 200 honours graduates in chemistry, 5 returned to teach in the universities, 100 took up teaching in schools and the remainder entered industry or took other work. For those who teach chemistry in schools an academic training is, of course, essential, and it can thus be seen that not more than half of those who enter universities would require any special training which might be thought desirable for industry.

It would not be very difficult to arrange for a divergency of courses. Very often the honours course in science, and perhaps particularly in chemistry and physics, is concerned largely with flights into the realms of abstruse theory, never required by the industrial chemist in his work; in many industries the chemist who has knowledge of his science up to the B.Sc. pass standard has all that is required for a basis upon which to build. A great number of industrial chemists would find themselves of better value to their employers if they took a pass degree in three subjects rather than specialised in the honours degree in one subject. Unfortunately the university authorities have assiduously fostered the belief that nothing but the honours degree is of any value. That is not true, and in a great many industries breadth of knowledge is of greater value than depth of knowledge over a similar area; in other words, the industrial chemist is not likely to be of his maximum value if he continues "to know more and more about less and less." It would, therefore, seem that universities would be well advised to give the industrial chemist thorough training up to pass degree with perhaps a little extra depth in chemistry, and to give a year's post-graduate course on industrial chemical practice under the direction of a lecturer or professor with a wide practical knowledge of industrial routine.

This, however, does not altogether dispose of the difficulty of vocational selection. It may be that we shall one day have brought the science of psychology to the point at which we can apply almost infallible tests to determine whether a man would be suitable for industry or for teaching. To-day we have to acknowledge the uncertainty of the human factor. Many students cannot make up their minds which line of work they should take up. Many a schoolmaster has turned afterwards to industry, though but few have travelled in the reverse direction from industry to teaching in schools. Re-reading the Manchester debate, we have on the one hand statements by some of those who took part in it to the effect that a completely academic training at the university had proved "no serious handicap" to those who had subsequently entered industry, and on the other that "the average university-trained chemist in this country would be useless to a firm like Bayer & Co., whose chemists are required to solve new problems as they arise." The essential difficulty is that the industrial chemist finds that he is part of an organisation which has the task not only of turning raw materials into finished materials, but also—and this is of fundamental importance—of finding a market for those materials. The academic chemist may soon learn to conduct control analyses and similar work with the speed and accuracy required for industrial purposes, but he is at a hopeless disadvantage when he comes to the fundamental problem of finding uses for his products. Such a disadvantage he cannot expect to eliminate completely at the university because experience also is required, but it should be possible for him to start with a much lighter handicap than he does at present.

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NOTES AND COMMENTS

Recovery of Waste

PUBLICITY in the national Press has directed wide attention to the importance of the recovery and use of industrial wastes; and the uninstructed journalist has been writing as though these processes were a war-time innovation. Actually the chemical and allied trades, the engineering and metal industries, the paper industries, and so forth, have been continuously recovering and using waste products as a matter of course, and the "anti-waste drive" of to-day represents merely an intensification of the process. Nevertheless, there are sound and unsound methods of waste recovery, and there is no harm in being reminded to-day of the most practical means of attacking a problem which has suddenly become of vital importance. *The Recovery and Use of Industrial Wastes*, by John B. C. Kershaw, F.I.C. (Ernest Benn, Ltd.), priced at 25s., is a book which is now of the highest importance to every type of industrialist, not to mention the controllers of municipal affairs. The author has described the methods of waste recovery practised all the world over. Those of the chemical and allied industries take the first place, and separate chapters are devoted to engineering, metallurgical, and mining wastes. The section on municipal and domestic wastes has a specially topical appeal to-day, while the paper, sugar, tannery and leather, rubber, and food trades are each treated exhaustively from the waste-recovery point of view. The copious illustrations and the detailed indexes greatly enhance the value of the book as a work of reference.

Egyptian Trade

EGYPTIAN trade figures for the March quarter, published recently in the *Board of Trade Journal*, reveal some remarkable changes brought about by the war. Most striking, if most obvious, is the fall of Germany from the third position, among countries from which Egypt drew her imports, to twenty-sixth. Exports to Germany ceased altogether. The most notable rises are to be found in the trade with the United Kingdom, comprising a rise in imports from £E.2,013,000 in the corresponding quarter of 1939, to £E.3,183,000, and in exports from £E.3,188,000 to £E.4,004,000. Imports from the U.S.A. rose from £E.543,000 to £E.1,041,000, but exports declined slightly from £E.252,000 to £E.215,000. On the other hand exports to France rose from £E.869,000 to £E.2,202,000. An outstanding feature of the figures is the advance in imports from Chile, which, amounting to only £E.200,000 in the March quarter of 1939, totalled £E.918,000 this year; exports to Chile, never of great importance, declined to zero. Further marked rises are to be noted in imports from the Dutch East Indies, India, and Japan, and in exports to Italy, Japan, China, Rumania, Hungary, and to Palestine, Syria, and Iraq.

Bevin's Benefit

WE record as a matter of news the arrival of what will be known as Bevin's Benefit. Unemployment insurance is to be extended to men earning up to £420 a year, benefit is to rank after two days of idleness, contributions are to be slightly increased and benefits all round improved. We make this record without comment, because we are interested in nothing but the winning of the war. We, in common with every decent element in the country, have forsworn political and economic controversy for the duration. The history of the Unemployment Fund will be known to all our readers. By 1931 the last Labour Government left the Fund £100,000,000 in debt. Under the last pre-war Government the position sensibly improved, while the war itself has made a vast improvement. War-time employment has reduced the call for benefit to such an extent that the balance on the right side of the fund accumulates week by week. Considered as a matter of insurance, this is as things should be, for there must be the need of a heavy credit balance when war employment ceases and unemployment once again becomes a matter of real concern. Thus, Bevin's Benefit illustrates perhaps better than anything in recent history, the difference between Great Britain and any other country in the world. The appeal to the workers in every other land involved in war has been an appeal for sacrifice. In France, where trade unions were extremely strong, long hours without extra wages were accepted as a matter of course. Germany is in another category, the people being well accustomed to the curious Teutonic mixture of slavery and sacrifice. Here, and here alone, we seem to be able deliberately to foster the notion that war can be made a matter of profit to the workers. There is some reason for congratulation in this, but also grave and serious reason for wondering when disillusionment will come, as come it must.

Export Group Formed

Arc Welding Electrodes

ABOUT 15 firms have intimated their intention of joining the Export Group formed recently under the auspices of the Board of Trade Export Council to promote the overseas sales of arc welding electrodes.

Major C. P. N. Raikes, a director of the British Oxygen Co., Ltd., is chairman of the Group, and the secretary is Mr. A. G. Seaman, 36 Kingsway, London, W.C.2 (Telephone: Holborn 0502).

War-Time Charcoal-Burning

The Use of Portable Kilns

by M. SCHOFIELD, M.A., B.Sc., A.I.C.

JUST as the last war provided an impetus to our wood distillation industry in the shape of demands for acetic acid and acetone, so has the present struggle caused an increase in charcoal production for the metal industries. Few wood-distillation plants remain in this country, for acetic acid and acetone come from other sources, while charcoal was imported cheaply prior to the outbreak of hostilities. The new demands for charcoal have brought a new lease of life to the old charcoal-burner, although he has been constrained to speed up his methods by use of kilns. This situation has arisen, fortuitously enough, out of the lack of imported timber from Scandinavia, which has led to the cutting of home-grown timber and the consequent provision of an abundance of forest waste, that essential material for charcoal manufacture.

Activities in the Forest of Wyre, which lies west of Bewdley, are comparable to-day with conditions met with in French forests in war and in normal times. Both the meiler and the portable kiln are to be seen, but the kiln predominates in these days, when high-grade charcoal must be prepared quickly. This preference for kilns stresses the change which charcoal has undergone from being a special fuel to becoming a recognised chemical and metallurgical raw material. The old charcoal-burner has been in operation sporadically in the Wyre Forest for some years. He may be a forest-worker or even a coal-merchant in times of little or no demand. When the call came to supply a batch of charcoal to a Birmingham metal-working concern, he built his meiler on a hearth or grating of round-sectioned wood or "rondins," kept a draught chimney in the centre, covered the pile with earth and leaves, and started combustion by throwing burning brands down the chimney opening. For five days and nights he remained on guard in his hut, opening or closing vents in the pile according to the rate of combustion, which depends on the prevailing wind, the moisture-content of the wood used, and other factors well known to the charcoal-burner. When clear blue smoke indicates completion of carbonisation in the centre, vents are opened lower down the pile until the entire mass has been carbonised. Finally vents are closed and the whole mass is left to cool.

Disadvantages of the Meiler Process

Although the hearth or meiler method involves no outlay nor wear-and-tear costs in plant, and no transportation of plant (the latter is an important point since charcoal-burning is carried out deep in the forest away from main roads), the kiln method worked by the Timber Supply Department of the Forestry Commission proves advantageous. The meiler process is slow. It yields charcoal containing a higher proportion of "fumerons," that is, red or foxy charcoal which is only partly carbonised. Impurities are introduced from the earth used in covering the meiler, and, should water have been used in quenching, this is absorbed. Hence kilns effecting the carbonisation in 20 hours and with far greater control are in full operation in the Wyre Forest, while the meiler has taken a subsidiary place dnuring the war period. These kilns are comparable in type to the *fours mobiles* used in France and sponsored by the Société Nationale d'Encouragement à l'Utilisation des Carburants Forestiers. The Magnein Kiln consists of two conical-sectioned steel sheet elements, one built on top of the other and with a circular lid on top. The elements are reinforced by "corner" joints and the wood is piled on a grating or grille built of small wood pieces. The Trihan Kiln or oven used in France is of circular or cylindrical section like those operated by the Forest Commission near Bewdley.

By constructing the Wyre Forest kilns in three sections plus a lid the problem was solved of obtaining a truly portable kiln capable of being moved from one site to another as occasion demanded. Like the French patterns there are four air vents or iron pipes at the base leading air supplies well into the mass of wood, and four outlet vents for fumes and pyroligneous vapours. The air vents in the earth at the base (tuyaux en tôle) can be seen in the photograph as well

Charcoal kiln in operation. Note the earth piled round the air vents.

as the four side chimney stacks resting on four buried smoke boxes over the outlet vents (tuyaux d'évacuation des fumées). By convection the side chimneys take those fumes not evacuated by the central chimney. The first operation is a charge the kiln with forest waste piled on end, a "chimney" space being left in the centre. There is no danger of choking round the vents, for a perforated circular iron sheet maintains a gap round the inside of the base. After the lid and the five chimney stacks have been fitted, the contents are ignited by introducing an oily rag in a vent. After a 20-hour partial combustion the central chimney is replaced by a circular plate, the side chimneys removed, and all vents closed to enable the kiln body to become a charcoal cooler. Finally, the charcoal is removed, bagged in 50-lb. sacks, and transported by tractor along the forest tracks. The product is inspected for fumerons and is then a homogeneous material answering to the tests for a good charcoal, emitting a metallic note when struck and not unduly soiling the fingers.

Permission to visit and inspect the charcoal kilns and to take photographs was made possible by the courtesy of the Timber Supplies Department of the Forest Commission to whom thanks are tendered.

THE POLYVINYL ALCOHOL RESINS recently introduced in the United States by the du Pont concern (see THE CHEMICAL AGE, June 22, 1940) are white to cream-coloured powders unaffected by oils, fats and most ordinary solvents. They are useful in aqueous solution as adhesives, emulsifying and thickening agents. Films may also be cast from the aqueous solutions and rendered insoluble by special treatment.

HEAT TRANSFER SURFACES

Finned Tubes for Gas and Air Conditioning

THE following article by Mr. Carlyle M. Ashley, Director of Development, Carrier Corp., Syracuse, N.Y., is one of several which appeared in a symposium on "Conditioning of Gases and Air," published in the May issue of *Chemical and Metallurgical Engineering* (pp. 319-21).

In choosing the heat transfer surface or interchanger to suit the needs of a particular application, we may list a number of factors of general importance which may influence the choice. Among the more important of these are: (1) cost, (2) resistance to fluid flow, *i.e.*, pressure drop, (3) space occupied, (4) volume of fluid required to fill the interchangers, (5) resistance to corrosion, (6) ease of cleaning, and (7) danger of damage due to freezing.

The relation of these factors to equipment choice can best be shown by a study of specific problems of heat transfer. Heat transfer between a gas and a liquid, and more specifically between water and air, should serve as a convenient starting point.

Film Transfer

As is well known, the heat transfer to a fluid which is in turbulent motion is limited by a slow moving film adjacent to the heat transfer surface. In this film the flow is non-turbulent and is parallel to the surface, thus requiring the heat to be transferred through the film by conduction. This so-called "film transfer" is a function not only of the conductivity of the fluid, but also of the velocity along the surface, the density of the fluid, the viscosity of the fluid, and the character of the heat transfer surface. For air the film transfer varies from a value of less than 1 B.Th.U. per hour per sq. ft. per deg. F. difference in temperature, for certain types of surface with gravity convection of air, to about 20 B.Th.U. per hour with very high air velocities. Usual values with forced air circulation lie between 5 and 15 B.Th.U. per hour. On the other hand, the film transfer for water in turbulent flow varies between limits of about 100 and 1200 B.Th.U. per hour with usual values around 300 to 800 B.Th.U. A preferred form of heat transfer surface for this application is a pipe coil consisting of a series of tubes across which the air flows and through which the water flows in a direction generally at right angles to the air. Since the heat must pass in series through the external and internal films and the metal of the tube, the low film transfer forms a choke point for heat flow.

To make the prime surface of the tubing more effective, extended surface is added on the air side in the form of fins. The added cost is only for the fins, yet the total air side transfer of the coil is increased in approximately the same order as the increase of the surface. The fins also introduce a new element of resistance to heat flow in the metal of the fins. With an all prime surface coil the conductivity of the tube is too great to be a factor in the problem, but with fins the amount of surface is increased and the cross-section is decreased. Metals having a high heat conductivity such as copper and aluminium are therefore preferred for fins and the thickness in relation to the size of the fin becomes a factor of importance. If a large amount of finned surface is added the choke point is transferred from the air film to the water film and metal until finally a point is reached beyond which a further extension of the fin is not economical.

Spirally wound finned surface finds its chief application as a blast coil with relatively high air velocities (300 to 800 ft. per min.). It is usually characterised by a high air film transfer and a high metal transfer. The plate fin surface overlaps the field of the spiral fin surface but finds its preferred application where extremely low resistance to air flow is required, as with gravity convection, or where the flow is induced by ejector action. For this service the tubes are spaced farther apart than is in accordance with good design practice with the spiral fin construction.

Face velocity is also kept very low. Under such a condition the air film transfer is low and thus more extended surface is economically justified, fitting in admirably with the wide tube spacing required. With close fin spacings a point is finally reached, as the velocity is reduced, where the transfer is entirely by conduction between the metal and air. Further lowering of the velocity has no further effect on the transfer. Thus, it is possible to get reasonably good film transfers (3 to 6 B.Th.U. per hour) with extremely low resistance to air flow. By decreasing the size of tubing used for the coil it is possible to decrease the spacing as well, and thus to decrease the thickness of the fin as well as the tube, making a less expensive surface. However, where a coil of some size is to be used the circuiting of the water becomes more and more of a problem as the size of the tube is decreased. Thus, for all but very small coils most of the tubing is from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in outside diameter.

The higher the air and water velocities used the less will be the cost of a coil to meet a given application, since the film transfers increase with increase of velocity. The increased velocity, however, results in an increase of resistance to flow. This in turn may result in an objectionable operating cost, may increase the cost of other parts of the system or may cause noise. For this reason specifications usually set a limit on the pressure drop on both the air and water side.

Consideration should always be given to proper selection of materials to resist corrosion even though no special corrosion problem is involved. Usually an all copper and brass surface is preferred, but there are cases where other materials may be substituted to advantage.

Where the water system is closed it is usually not necessary to make provisions to clean the water side, but where water which may bear silt or scale is used it may prove desirable to provide access through a removable header. If the air is dirty there may be a collection of dirt on the surface. Most of the dirt will collect on the entering side and can be removed by brushing, or with a jet of air or water. In some cases, however, it has proved desirable to divide the coil so as to provide access to each row.

Protection against Freezing

Where a water coil is in an air stream which may drop below freezing point some means of protecting it must be worked out. Either a non-freeze solution must be used, or else the coil must be drained. Unfortunately, the usual water coil does not drain readily. Its water circuits zig-zag back and forth from end to end of the coil so that the coil must be kept level. Pitching it either way will trap water in some portion of the coil. On the other hand the small tubes do not drain readily owing to capillary hold-up of water and owing to the effect of slight, unavoidable differences in level. To be safe against freezing, therefore, it is advisable either to blow out the coil with compressed air, or to give the coil a slope towards one end.

It is fortunate that the film transfer of steam and of evaporating and condensing refrigerants is in the same range as that of water as it permits the use of a similar type of surface with all these fluids.

Besides the uses of this finned interchanger as an air cooler and heater, and as a refrigerant evaporator and condenser, it also has many uses where the surface is wet. Where used as a cooler or evaporator the surface may be below the dewpoint of the surrounding air, resulting in condensation of moisture on the surface. For other applications water may be sprayed on the surface. For a cooler or evaporator this may be done to provide extra scrubbing action, to provide continuous humidity control or to remove frost (spraying brine) when the surface is below freezing point. Another important application of sprayed surfaces is as evaporative condensers. The spiral fin surface is particularly suited to application as a sprayed surface owing to its tendency to re-

distribute water from row to row and to its relatively low resistance factor. When high air velocities are maintained through wetted coils the water tends to carry through and requires the use of eliminators. When the coil surface is wet the transfer of heat is related to the difference in total heat between the air and the surface instead of the difference in temperature.

The same type of surface is suitable for use with gases other than air in chemical process work. The problem of transfer from one liquid to another, or from liquid to evaporating liquid or condensing vapour usually requires a rather different solution.

In refrigerant condensers it is usually economical to use some extended surface, even though the condensing film transfer rate is fairly high. In this case, however, the fins must be low and thick so as to keep the metal transfer high. The use of fins increases the capacity of a given size of condenser and at the same time by shortening each circuit permits the use of higher water velocities with the same pressure drop.

In interchangers, cooling water by refrigerant evaporation, the same considerations govern as in condensers. Another important reason for the use of fins is to reduce the required charge of refrigerant, frequently a factor of importance in the total cost of the cooler. Besides this the more compact surface results in a higher refrigerant film transfer. In a recently introduced type of refrigerating machine both condenser and cooler were provided with fins extruded from the tube itself. The fins were so short that the ends could be belled to the diameter of the fin, thereby making possible the individual removal of each tube from the tube sheets. Results obtained were beyond theoretical expectations.

Condensers and water coolers are of four primary types: (1) shell and tube construction with tubes between two tube sheets and water usually through the tubes; (2) shell and tube construction with one tube sheet and return bends on the other end; (3) shell and coil construction, either with coil with return bends or wound in a spiral or helix; and (4) double pipe construction. Where cleanable tubes are required the first type is preferable although the second may be used.

Liquid to liquid interchangers take a wide variety of forms. Where one of the liquids has a high viscosity and low conductivity, as for instance, oil, the use of extended surface may be employed, using a shell and tube interchanger or a shell and coil. Another approach is through the use of thin passages for the viscous liquid so that the heat transfer by conduction is high. This may be in the form of a double pipe interchanger or a plate interchanger. The latter is particularly well adapted to uses requiring a low pressure drop.

Where the film transfer of both fluids is high, it is customary to use prime surface either in a double tube, coil and tube, or shell and tube interchanger. However, where the cost of the construction is high, fins on one or both sides are economically justified.

Industrial Toxicology

Proposals for a National Laboratory

THE establishment of a National Laboratory of Industrial Toxicology under Government control, to support the work of the Medical Research Council, was urged by the Association of Industrial Medical Officers, when it presented evidence recently before the Royal Commission on Workmen's Compensation, sitting at Thames House, Millbank, London, S.W.1, Mr. R. R. Bannatyne presiding. The duty of such a National Laboratory would be to pronounce by certificate on the safety of toxic substances to be used in industry.

The Association pointed out that it was not fully realised that the user of toxic substances might omit to make adequate provision for the safety of his employees from industrial disease, unless he was aware of the dangerous properties of those substances, as disclosed by the manufacturer. For instance, benzene was a common constituent of certain solvents, and the prolonged inhalation of its vapour might give rise to serious illness or even death. Yet there was no obligation on the supplier to warn employers that a particular solvent contained a dangerous constituent. Again, the chlorinated naphthalenes were known to be capable of producing serious and sometimes fatal illness, yet there was no legal obligation on the part of the supplier of those substances to disclose the toxic properties to purchasers. It could be seen, therefore, that employers might fail, through ignorance, to provide the simple safeguards required to protect their workers.

"There is no provision in law to prevent a manufacturer from marketing an entirely new product under an old trade name," the Association pointed out. "Thus, what has been known to be harmless may, unknown to the user, become a harmful product, and the process may be brought within certain regulations from which the user honestly believes himself to be exempt. New ingredients may be incorporated in a process without warning, and at times with definite risk to the user. We consider that this should be covered by legislation."

It was observed that some industrial poisons were insidious in their onset, with symptoms often indistinguishable from those of non-occupational diseases. It was, therefore, recommended that there should be undergraduate training in industrial toxicology in all medical schools, and facilities, particularly in industrial areas, for post-graduate study in industrial toxicology and hygiene. The Association called attention to the fact that periodic medical examination of workers exposed to industrial toxic hazards had done much to prevent the onset of occupational disease. As a result of periodic examinations, which at present were mainly of a statutory nature, a medical officer was enabled at an early date to advise the employer on the extent of the hazard, to arrange for transfer to other work, or to give relevant information to the panel doctor and hospital services. Such measures were an essential part of preventive and early treatment, and the Association strongly advocated an extension of such examinations.

Hydrazoic Acid

Dissociation Constant Calculated

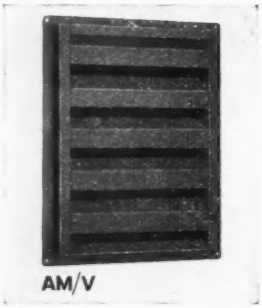
IN a note to the Academy of Sciences (C.R. Acad. Sci., *210*, p. 625) Marguerite Quintin reports the results of studies on the dissociation constant of hydrazoic acid. The apparent dissociation constant has been given incidentally by various writers, at anything from 0.7×10^{-5} to 2.6×10^{-5}, but no direct measure seems to have been made. She prepared the acid from sodamide and sulphuric acid and then tested the strength of the hydrazoic acid in three ways. (1) By transformation of the acid into silver nitride which (since it explodes on being dried out of solution) was then transformed to chloride and weighed; (2) by volumetric analysis with a known soda solution in the presence of phenolphthalein; (3) by electrometric analysis with examination of the variation in pH by means of a glass electrode, on the addition of a known soda solution and then calculating the point of equivalence of the curve.

The second method gave slightly higher values than the others, but when carried out in a closed vessel so as to avoid evaporation, this method agreed with the others. "If kept in the dark in a closed container under an atmosphere of nitrogen and away from any dust which can act as a catalyser, solutions of hydrazoic acid are perfectly stable. The solutions remained identical for 50 days and the most concentrated (0.08 M) showed a maximum drop of 0.03 units of pH between the 50th and 75th day." These tests were completed by tests of the constant of the acid at different ionic strengths, obtained by addition of potassium chloride. The resultant calculations give the dissociation constant as 2.8×10^{-5}.

Ventilation in the Black-out

Light Obscuration Ensured

ESSENTIAL adherence to strict black-out regulations has resulted in difficulties in providing adequate ventilation. The primary results of inadequate ventilation are lowered vitality among workers and predisposition to disease. The secondary results are inefficiency and a rapid decline in production. In chemical works, where the presence of dangerous, or at all events undesirable, vapours is always a possibility to be considered, the question of ventilation assumes special importance. Realisation from the outset that a remedy must be found has prompted a thorough study of this problem, and the Colt Black-out Ventilator is now offered as a complete solution to the problem of ventilation with light obscuration.



All-metal vertical ventilator of standard size

Wind-tunnel tests in the laboratory and practical tests under actual working conditions have not only demonstrated the remarkable efficiency of the Colt Black-out Ventilator but they have provided valuable data regarding the area ventilators required for varying types of rooms and buildings. Consulting engineers have investigated the efficiency of this type of ventilator from the point of view of light obscuration. They have demonstrated that at the point where any one ray of light strikes the first louvre of the ventilator about 97 per cent. of its intensity will be absorbed and repressed, and the remaining 3 per cent. will be split up into an infinite number of weak sub-rays proceeding in different directions from the point of impact. Each such sub-ray in striking any further member or louvre of the ventilator will be again reduced in intensity and scattered into sub-sub-rays in the same way as before, resulting in less than .0009 per cent. getting through, representing a quantity invisible to the human eye.

Colt Black-out Ventilators in standard sizes and of various types—all-metal, or wood framed with metal or fibre louvres—are available for immediate delivery.

Chemical Matters in Parliament

Potato Starch

IN the House of Commons last week Mr. R. Gibson asked the Parliamentary Secretary to the Ministry of Food how much potato starch and kindred products he proposes should be imported during the current season?

Mr. Boothby replied that no such imports were in contemplation.

In reply to a question by Mr. Denman as to whether the Ministry proposed to limit the use of starch, as was done in the last war, Mr. Boothby answered that such a limitation was not at present contemplated.

Mr. Robert Gibson again this week asked the Parliamentary Secretary to the Ministry of Food whether he had yet made arrangements to make use of a portion of this season's potatoes for the making of potato starch; and what progress had been made with the erection of factories for this purpose?

Mr. Boothby replied that returns recently obtained showed that the stocks of potato starch now held in this country were sufficient to meet essential industrial requirements for a long period, and that it was not proposed to embark upon a policy of home manufacture at present; but the position would be kept under constant review.

On a further question from Mr. Gibson as to whether the erection of factories was being proceeded with, Mr. Boothby replied that that was not the case at present.

British Organic Fertilisers

New Association Registered

THE Association of British Organic Fertilisers, Ltd., was registered on June 29 as a company limited by guarantee without share capital (file No. 362,127). For the purpose of registration the number of members is declared not to exceed 300, each being liable for not more than £1 in the event of winding up. The objects are to promote and protect trade in organic fertilisers and organic materials of all kinds suitable for soil improvement in Great Britain and Northern Ireland, and to support and protect the character, status and interests of all persons engaged therein.

The management is vested in a Council, the first members of which are: S. L. Sheldrick (president), 16 Blenheim Road, St. Albans ((D. T. Boyd, Ltd.); J. A. Smith (vice-president), 35 Maldon Road, Wallington (C. T. Bowring and Co., Ltd.); H. G. Chamberlain (treasurer), 16 Spencer Gardens, S.E.9 (A. J. Bell, Ltd.); Arthur Cole, Oakleigh, Keynsham, Bristol (Organic Ammonia Co., Ltd.); Maurice A. Condall, 140 Court Lane, S.E.21 (Thos. Elliott, Ltd.); Maxwell H. C. Green, 4 Waltersville Way, Horley (Chas. Page and Co., Ltd.); Henry A. Gwyer, Parkside, Cheam Village (Cookson Produce and Chemical Co., Ltd.); Arthur J. Hall, 31 Eglinton Road, Chingford (Harrison, Barber and Co., Ltd.); Ernest L. Jones; Hugh J. Murray (Chas. Spalding and Sons, Oldbury); F. Partridge (Thornhill Manure Co., Ltd., Dewsbury); Horace J. Saywell; W. C. Smith (Organic Ammonia Co., Ltd., Glasgow); and Eric W. Upton (London Fertilisers Co., Ltd.). Secretary: Wallace W. Pigott. Registered office, 84 Leadenhall Street, E.C.3.

Chemical Cotton in India

Pilot Plant Ordered

IN pursuance of a decision taken some time back by the Indian Central Cotton Committee, experiments in connection with the manufacturing of chemical cotton will be carried on in the Technological Research Laboratory of the Committee in Bombay probably from the beginning of the current financial year. The Government of India has sanctioned the expenditure to be incurred by the Committee in purchasing a pilot plant which will give a reasonable indication of the commercial possibilities of the project. It is, however, gathered that there will be no separate pilot plant for testing and grading linters meant for export purposes. The orders for the pilot plant have been placed by the Committee. If the experiments prove a success India will not have to depend on foreign supplies of artificial silk yarn, the imports of which are at present considered to be heavy, to the detriment of the cotton manufacturing industry in India. Besides supplying the needs of the art silk mills, which have been gradually increasing, the project will help to tackle, to a certain extent, the problem of the disposal of short staple cotton which is at present a burden on the Indian market.

Imports for War Contracts

Board of Trade Advice to Contractors

GOVERNMENT contractors and sub-contractors are urged by the Board of Trade to avoid all unnecessary imports and at the same time to assist in speeding-up delivery of imports essential for completion of urgent war contracts. Delay in delivery of essential imports, the Board of Trade states, is being caused by failure of contractors to comply promptly and fully with import licensing requirements.

This can be remedied by (1) applying for import licences well in advance and not when goods have arrived at ports; (2) sending with applications for licences evidence that goods are essential for a specified Government contract and cannot be bought in this country. Nothing that can be bought at home should be ordered from abroad. The need for avoiding unnecessary importing of goods is greater than ever, because every foot of shipping space and every penny of foreign exchange are required for the immediate war effort.

Personal Notes

MR. DONALD ECCLESHALL, B.Sc., of Sutton Oak, has been admitted to membership of the Institution of Chemical Engineers.

* * * *

MR. E. J. BOND has been elected chairman of the Manchester section of the Oil and Colour Chemists' Association, and DR. F. J. SIDDLE vice-chairman.

* * * *

MR. J. W. URBAN, latterly Development Sales Manager with Monsanto Chemicals, Ltd., has joined the Tyneside Safety Glass Company, Ltd. (a subsidiary of Colmore Adhesives, Ltd.) as general manager.

* * * *

M. ANDRE LABARTHE has been appointed by General de Gaulle Director-General of all French services connected with armaments and scientific research in Great Britain. He has appealed to French engineers, scientists, and industrial workers to join the already large number of their colleagues who have enlisted as civilian workers in the legion.

* * * *

At the annual spring meeting of the Electrodepositors' Technical Society held in London recently the following officers were elected for the forthcoming session: President, H. J. T. ELLINGHAM, Ph.D., A.R.C.S., A.M.I.Chem.E., F.I.C.; vice-president, S. FIELD, A.R.C.S.; hon. treasurer, F. L. JAMES; hon. secretary, S. WERNICK, Ph.D., M.Sc.; hon. secretary Standards Committee, C. FRANCIS CARTER, A.M.I.Chem.E., A.I.C.

* * * *

Following the release of Mr. J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers for special service with the Ministry of Supply as Deputy Director General of Chemical Research and Development, the Association has appointed MR. R. MURDIN DRAKE, M.Sc. and MR. ALLAN J. HOLDEN, B.Sc., F.I.C., as joint assistant secretaries and assistant managers. Mr. Drake has also been appointed acting secretary of the Association of Tar Distillers.

* * * *

The King has approved the award of the medal of the Civil Division of the Order of the British Empire, for Meritorious Service, to the following employees of a Royal Ordnance Factory in the vicinity of London: MR. HUGH BURNS, who while in charge of No. 1 washing-house on the occasion of an explosion in the factory, carried out the purification of half a ton of nitroglycerine and thus rendered it safe, although he himself was injured; and MR. EDWARD SOLLIS and MR. WILLIAM T. J. WEST who, though the building in which they were working was damaged by explosion, remained on duty until nitroglycerine had been disposed of safely.

* * * *

MR. E. W. MANN, B.Sc., F.I.C., Ph.C., a Director of Southall Bros. and Barclay, Ltd., of Birmingham, entertained the whole of the employees to tea on Friday last week, to mark his retirement from active participation in the direction of the business, after 48 years' service. He had been elected to the Board of Directors in 1916, and became managing director in 1935. MR. A. T. HALL, Ph.C., who succeeds Mr. Mann, presented him with a gold watch, on behalf of the staff, and referred to their 40 years' association in the business. Mr. Mann still retains his seat on the Board and will continue to act in an advisory capacity to the company.

OBITUARY

FLIGHT-LIEUT. GEORGE L. P. ZECH, who gave his life in the fighting at Dunkirk, was works manager with Messrs. Sandeman's Varnish, Ltd., Glasgow, where his father, Mr. Paul Zech-Dupont, is managing director.

Filtration of Hydrocarbons

A Simplified Method

A METHOD whereby the filtration of liquid hydrocarbons for the removal of solid impurities can be facilitated has been developed by the Dutch firm, N. V. Internationale Hydrogeneeringsoctrooien Mij. They have found that if the hydrocarbon to be filtered is mixed with an acid in an organic solvent, separation of the solid impurities is greatly facilitated. This method, they point out, is particularly applicable to the purification of oils produced by hydrogenation of coal. The acids that may be utilised are sulphurous anhydride, the hydrohalogen acids and halogens, phosphoric acid, boron fluoride, a hydrosulphide or chloride of aluminium, zinc or sodium, or silicon fluoride. The solvents that can be used are principally those which aid in precipitation by causing flocculation or polymerisation of the asphalts. Possible mixtures, for example, are hydrochloric acid or sulphurous anhydride in methanol, aluminium chloride in benzene, zinc chloride in alcohol, phosphorus pentoxide and formic acid, etc. About one to five per cent. of the acid-solvent mixture is added to the hydrocarbon to be filtered, and the mixture is heated to 200°-300° C., if necessary under pressure. It is then filtered either on asbestos or in a centrifuge. If the solvent and the acid used are volatile, they can be removed at this stage by distillation, condensed and re-used. As an example of the possibilities of the system, it is suggested that 60 parts of the residual mud of hydrogenation can be mixed with 40 parts of heavy oil and this mixed with 1.2 per cent. of a saturated solution of hydrochloric acid in methanol. This is mixed and heated together for an hour at 250° C. and then filtered on asbestos cloth.

Industrial Research in India

Formation of a Research Board

PROMINENT Indian scientists and industrialists have been appointed to the Board of Scientific and Industrial Research which the Government of India have decided to establish as a consultative body to ensure co-ordinated development of India's industries, particularly those whose importance and potentialities have been brought prominently into the foreground by war conditions.

Demands for war materials from the Empire and Allied countries and also for India's own requirements in this field call for an increase in industrial activities in India. The Government has therefore decided that in order to enable India to make a fitting contribution to the war, research work should be conducted on a larger scale than at present.

The Board will co-ordinate the work of the existing organisations already employed in this field. It will survey the work that is being done by them, invite proposals from all sources, initiate discussions and make recommendations to the Government who will prescribe from time to time the general lines on which industrial research should be pursued. The Board will also recommend specific problems to be assigned for investigation to the staff directly under the Board on the one hand and to the various scientific and research institutions in the country on the other.

The composition of the Board has been so designed as to ensure that all proposals for research are examined and judged not only from the scientific but also from the commercial standpoint. The first Board will consist of the following:—Dr. S. S. Bhatnagar, Sir H. P. Mody, Dr. J. C. Ghose, Dr. Nazir Ahmed, Dr. M. N. Saha, Sir Sultan Ahmed, Mr. K. Lalbhai, Lala Shri Ram, Mr. F. F. G. Warren and Dr. N. N. Law. The Commerce Member of the Government of India will be chairman of the Board and the Chief Controller of Stores, Indian Stores Department, its first vice-chairman. The Government has been able to secure the services of Dr. Bhatnagar, of the Punjab University, as the first Director of Scientific and Industrial Research.

General News

THE AIR MINISTRY has issued a specification (No. D.T.D. 395) for ethylene glycol mono-ethyl ether (price 6d., post free, 7d.).

THE LONDON AND SCANDINAVIAN METALLURGICAL COMPANY, LTD., have transferred their main offices to 5 Lauriston Road, London, S.W.19. (Tel.: WIMbledon 1062). A small staff to deal with inquiries is remaining at Thames House.

GLASGOW MUNICIPAL GAS DEPARTMENT reports that for the financial year ended May 31, 1940, the revenue from chemical by-products realised £16,000 more than had been expected, the markets for these products having lately been affected by the obscurity in the export position.

THE FIRM OF JOHN C. CARLSON, of Weir Mill, Mossley, Lancs., has been transformed into a limited company and is trading under the name of John C. Carlson, Ltd. The new company is already in the process of manufacturing the new "Carlson" filters.

THE EMPLOYEES OF SOUTHALL'S (Birmingham), Ltd., wholesale chemists, at the Saltley and Bromsgrove factories, expressed the desire to subscribe weekly to the fund for the British Red Cross and St. John's. Collections began recently; the first week produced £11 3s. 2½d.; and last week £11 2s. 7½d. The collection will be continued weekly for an indefinite period.

ST. DUNSTAN'S, IN ITS ENDEAVOUR to explore the possibilities of the blinded man taking part in the industrial workshop, has secured the active co-operation of Lord MacGowan, of I.C.I., Lord Nuffield, representing engineering, Sir Kenneth Lee, of the textile industry and other experts on a Research Advisory Committee. Records have shown that a blinded man can operate an automatic or semi-automatic machine with dexterity and efficiency. This suggests a new field of employment for the blinded man, and he should be allowed to develop it and take his place in industry. The primary function of the Research Advisory Committee of St. Dunstan's would be to give the officials of St. Dunstan's and the London School of Hygiene entrée to industrial establishments with a view to investigating and, if necessary, experimenting on the possibilities of the blinded man working at a machine.

Foreign News

A UNITED STATES PRODUCER is now marketing potassium permanganate in fine powder form. The material is stated to be approximately 95 per cent. through a 200-mesh screen.

CYANAMIDE EXPORTS FROM Yugoslavia rose from 23,210 metric tons in 1938 to 27,741 in 1939. Italy was the largest importer, with 15,733 metric tons, and Germany was second, with 7377. Exports of oiled cyanamide were practically unchanged (15,576 metric tons in 1939, 15,737 in 1938).

PRODUCTION OF SULPHUR in the United States in 1939 amounted to 2,090,979 long tons, a decrease of 13 per cent. compared with the output in 1938 of 2,393,408 tons, according to the Bureau of Mines, U.S. Department of the Interior. Production was reported from California, Louisiana, Texas and Utah. Exports of crude sulphur in 1939 totalled 627,819 long tons, compared with 579,107 tons in 1938, an increase of 8 per cent. Of this, Canada imported 142,437 tons in 1939 (82,651 tons in 1938); United Kingdom, 112,810 tons (99,135); Australia, 109,341 tons (108,465); New Zealand, 49,753 tons (43,167); France, 39,811 tons (98,751); and Argentina, 29,051 tons (16,102).

THE BATIK INDUSTRY in the Netherlands Indies has experienced considerable difficulty since the outbreak of war owing to its inability to continue obtaining the special aniline dyes which have been imported from Germany for about thirty years. A shortage of artificial dyes would not affect the native producers of batik in the Principalities of Solo and Djocja to an appreciable extent as compared with those in other parts of the island, such as the Pekalongan and Batavia districts, as indigo is still cultivated on a considerable scale in mid-Java. The area under indigo harvested in 1938 totalled 1739 hectares, an increase of 18.4 per cent. as compared with 1937, but a decrease of 21.1 per cent. from the annual average for the 10-year period 1928-37.

From Week to Week

A MARKED ADVANCE WAS RECORDED in Canada's imports of tin in blocks, etc., in April, the total being 5577 cwt. valued at $278,622, as compared with 1651 cwt. at $75,668 in April, 1939, according to the Dominion Bureau of Statistics. The Straits Settlements contributed 4692 cwt., and the United Kingdom the balance.

SALES OF COMMERCIAL SALT by Canadian producers in February totalled 12,188 tons in comparison with 12,493 in January and 10,982 in February, 1939, according to the Dominion Bureau of Statistics, while during the first two months of 1940 sales aggregated 24,681 tons as compared with 21,517 tons in the same period of 1939.

THE STOCKHOLM CORRESPONDENT of *The Times* reports that an agreement signed in that city last Saturday provides for an increase in Swedish cellulose exports to Germany of some 200,000 tons, amounting to 10 per cent. of Sweden's normal annual production. The German negotiators are stated to have gone to Finland to begin similar discussions there.

UNITED STATES SALT SUPPLY for 1939 was the largest ever reported, according to the Bureau of Mines, United States Department of the Interior, exceeding the nearest previous record (1937) by 36, 347 short tons. The output of 9,277,911 tons, valued at $24,509,680, more than made up the million-ton drop in 1938 production which aggregated 8,025,768 tons, valued at $23,242,561. All three types of salt—rock salt, evaporated salt, and salt in brine—shared in the increase, but salt in brine contributed by far the greatest part, having 4,584,177 tons to its credit in 1939 compared with 3,694,807 tons in 1938; evaporated salt came next with 2,658,577 tons (2,429,100); and rock salt last with 2,035,157 tons (1,901,861).

Electricity in the Japanese Chemical Industry*

Increased Production of NaOH

ELECTRICAL energy is used extensively by the Japanese chemical industry either for heat-generation or for electrochemical reactions. More than one-half of the hydrogen for the synthetic ammonia industry is made by electrolysis of water. Seven out of the 13 firms in this field use electrolytic hydrogen made in cells of the Knowles, Casale, Fauser or Hitati Manufacturing Company type. The more recently established factories, however, are using hydrogen from coal gas and this tendency is likely to become more marked. Electrolytic production of caustic soda is also a considerable industry. Diaphragm cells in use are the Nakano and Yosimura types (both horizontal), Billiter-Siemens, Nelson, Allen-Moore and Hooker S-type. Mercury process caustic cells, as designed by the Osaka Soda Company and the Krebs Company, are employed for the manufacture of salt-free caustic soda to be used by the viscose rayon industry. Japanese production of caustic soda has increased greatly in the last few years; the increase applying to both the electrolytic and the caustification alkali.

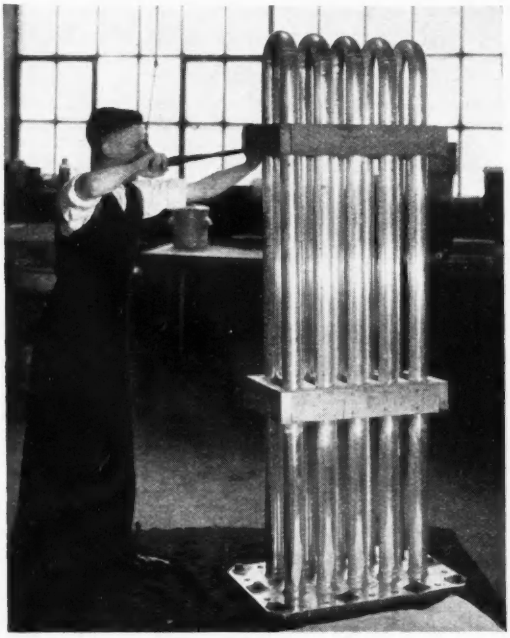
Electricity also plays a part in the production of aluminium, sodium, and sodium perborate. It is used in the electrolytic refining of copper, silver, gold, lead, bismuth, tin, and iron. Calcium carbide, carborundum, alundum, and phosphorus are made by electrothermal processes. Calcium cyanamide is made from calcium carbide by nine companies, most of whom use the continuous electric furnaces designed by Dr. T. Hujiyama. The Frank-Caro furnace is used to a lesser extent. In the Hujiyama process the powdered calcium carbide is fed continuously into the top of a vertical brick-lined iron chamber. It meets a stream of nitrogen injected half way down and the calcium cyanamide is discharged at the bottom. The carbide is heated by the radiation from electrically heated carbon rods arranged round the charging hole.

* J. Soc. Chem. Ind. Japan, Feb. 1940.

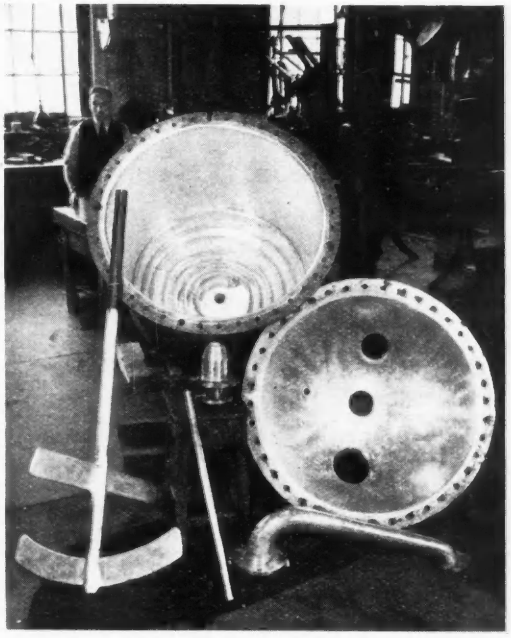
Metallurgical Section

Published the first Saturday in the month.

★ The illustration below shows a silver covered copper 'U' tube heating unit for Distillers Ltd. The copper tube is covered with Matthelytic Silver .030" thick and the total weight of the job when assembled is 5½ cwt. Weight of silver employed 1,080 troy ounces.



★ A silver lined copper still for the distillation of acetic acid. This plant, recently completed in the workshops of Johnson, Matthey & Co., Limited, has a total weight of half-a-ton, the weight of the fine silver involved being only 1,500 troy ounces.



PURE SILVER IN INDUSTRY

In recent years increasing attention has been given to the advantages to be gained by the use of pure silver for the construction of plant, or for the linings of plant employed in the production of acetic acid, vinegar, jam, formaldehydes, essential oils, photographic chemicals and drugs. It is, however, only in the last decade that manufacturers have given serious consideration to its widespread application, on account of the low level to which the market price of the metal has descended.

Wherever the problem is one of the product corroding the plant or the plant contaminating the product, pure silver merits consideration by reason of its noble characteristic of high corrosion resistance.

It offers other advantages such as saving in heating and cleaning costs, since silver is the best known thermal conductor and in the pure form used for plant manufacture is immune from atmospheric tarnish.

We have available publication No. 66, which gives full data as to the capabilities of pure silver for process plant. It gives information as to the type of plant we are able to supply and the forms of existing plant which it is possible to treat.

AMPLE SUPPLIES OF SILVER ARE AVAILABLE WITHOUT RESTRICTION FOR THE MANUFACTURE OF INDUSTRIAL PLANT

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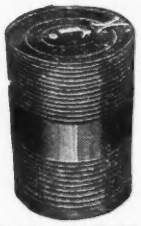

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Phone: 2267 WIDNES Grams: "Todd"

British Standard Specifications

Copper Alloy Bars

REVISED specifications have just been issued for the following :—

B.S. 218.—Brass bars and sections, suitable for forgings and drop forgings.
B.S. 249.—Brass bars (high-speed screwing and turning).
B.S. 250.—High tensile brass bars and sections.
B.S. 251.—Naval brass (Admiralty mixture) bars and sections.
B.S. 252.—Naval brass (special mixture) bars and sections.
B.S. 369.—Phosphor bronze bars or rods for general purposes.

The revision has been effected to bring these specifications up to date, and there are two outstanding features. The first is that Standards 218, 251 and 252 have been amplified by the addition of a separate section to provide for forgings. The other is the fact that the revised specifications now supersede a number of aircraft specifications in the B series as follows :

3 B 1.—High tensile brass bars.
3 B 6.—Naval brass bars.
3 B 11.—Brass bars suitable to be brazed or silver soldered.
3 B 13.—Brass bars (high-speed screwing and turning).
DTD 78.—Phosphor bronze bars.

Testing Fusion Welds, etc.

This British Standard, applicable to the electric arc welding of steel, was first issued in November, 1936, but was then confined to the standardisation of the bend test as applied to welds and welded joints. Since that date the use of welding in industry has made further strides and the present revision has been undertaken in order to include standards for other forms of test and to co-ordinate and simplify the various tests which are already in existence. The advantages resulting from the adoption throughout the industry of similar test pieces and the same methods of testing so as to enable test data to be readily compared and correlated are obvious. It is hoped, therefore, that the standard will serve an exceedingly useful purpose.

In the Specification (B.S. 709) a general indication is given of the use to which each of the different tests may be put, but it does not purport to lay down when any particular test should or should not be used on a given structure or what the test results should be. Such requirements are matters to be dealt with in the preparation of each particular specification in which welding forms a part.

Copies of any one of the above specifications may be had from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 3d. post free.

Cold Rolled Copper Sheet

A British Standard for cold rolled copper sheet and strip (half-hard and annealed) for general engineering purposes has now been published. This specification supersedes the specification which existed in the aircraft series—No. 2 B.15—for copper sheets for aircraft purposes, and which will now be withdrawn. The composition clause has been so framed that an arsenical copper can be provided under the specification if desired. The tensile strength of the material is 17 to 21 tons for half-hard material and 13.5 to 17 tons for annealed material, in thicknesses from 3 S.W.G. (0.252 in.) and thinner, and in widths up to 42 in.

Copies of this new British Standard (No. 899) may be had from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 3d. post free.

The June issue of the "Wild-Barfield Heat-Treatment Journal," published by WILD-BARFIELD ELECTRIC FURNACES, LTD., contains an informative article on the spectroscopic analysis of steels by Mr. A. Fisher, metallurgist, Magnesium Elektron, Ltd. Another feature of the issue is a page of abstracts and references on heat-treatment and allied subjects.

Metallurgical Section

July 6, 1940

COKE FOR COPPER BLAST FURNACES

The Importance of Careful Control

By A. G. AREND

THE importance of copper production in war time requires no emphasis, and in order to ensure the highest output under the most ideal conditions, the coke employed must be kept under close control. Copper blast furnaces differ in construction from those used for iron smelting, and the combustion of the coke in presence of a metal with a lower melting point has to be taken into consideration.

As the pressure which the individual charges exert upon the coke affects the combustion, and as the proportions of ore, fluxes, etc., vary with increasing and diminishing percentages of slag, the smelting is of a more complicated order than iron smelting. Where the ore remains more or less consistent in composition, difficulties with the coke seldom appear, and are soon standardised, but in this country it is usually necessary to include any cupriferous materials available, in order to increase the output, thus adding to the difficulties. The smaller dimensions of the copper blast furnace make it possible to keep a stringent check on the depth of the charges, which is done by lowering a flat iron plate from the charging door suspended from a graduated steel rope. Should the coke or ore lie in a slanting position this is made immediately apparent, and if not attended to can interfere with the production of speiss. When fresh consignments of coke arrive, they are examined to note whether they possess the right colour, lustre, well-developed structure and hardness, besides being sonorous and strong. The cell-spaces are smaller than with ordinary gas-coke, and are expected to be kept within a fixed percentage, *i.e.*, from 40 to 50 per cent., but, in some American copper-smelting practice, coke with as much as 61 per cent. cell-space is used successfully. It is known that dry coke exposed to moist air absorbs about 2.5 per cent. of moisture, and when immersed in water can absorb some 20 to 50 per cent. of water, but readily gives up again the major part, retaining about 10 to 15 per cent. In wet weather this has to be taken into account, as both volume and weight of coke per charge are approximately recorded. Square wooden boxes are constructed into which the coke is measured and weighed, so as to obtain the weight per cubic yard. Some smelters prefer a mixture of cokes, so that any slight discrepancy is minimised and the density in bulk compared as distinct from specific gravity of samples. Practical troubles have arisen through feeding too much of the charge into the centre of the furnace, so that the coarse coke and large pieces of ore, slag and fluxes rolled to the walls, making lines of least resistance which caused over-fire and bad reduction. Thus the position of the coke, as well as its volume and weight, must be controlled. The measurement of one cubic yard gives no true criterion, and it is necessary to check this finally in cubic feet occupied per ton.

A Comparison of Cokes

Four cokes from ovens in this country occupied respectively 69, 79, 80 and 90 cubic feet per ton. The first three were from patent oven products, and the fourth was beehive, and gave the best results.

As it was recognised that good results had been obtained in German copper smelteries, which were claimed to surpass our own, a wide survey was made of the best cokes used in that country. An average was taken from two different consignments which are given in detail herewith :—

Silesian coke weighed 6.62 and 7.2 cwts. per cubic yard, working out at 81.7 cubic feet per ton.

Saar coke weighed 5.4 and 6.62 cwts. per cubic yard, working out at 94.5 cubic feet per ton.

Westphalian coke weighed 4.95 and 6.31 cwts. per cubic yard, working out at 94.5 cubic feet per ton.

Thus the best German cokes had a slightly greater volume per ton than those obtainable here.

Volume of German Cokes

A detailed account was then secured of the volume of cokes derived from different German coals given in kilograms per cubic metre, as follows :—Westphalian, 330 to 420 kg. ; Saar, 360 to 400 kg. ; Lower Silesian, 400 to 420 kg. ; Upper Silesian, 390 to 450 kg. ; Saxon, 380 to 420 kg. ; Bohemian, 330 to 370 kg.

With regard to heating value in calories, two Westphalian cokes gave 7057 and 6716 respectively, Saar coke gave 6936, and Silesian coke gave 7111, as compared with English coke at 6695. The cokes were compared not merely by the usual proximate analysis, to ascertain proportions of ash, fixed carbon, volatile matter, and perhaps sulphur, but also by ultimate analysis, giving the percentages of carbon, hydrogen, oxygen, nitrogen, and sulphur, together with the total carbonaceous matter.

A survey of the table of coke analysis will reveal the relative consistency of nitrogen and sulphur contents, and the somewhat wide variation in oxygen and hydrogen percentages.

TABLE OF COKE COMPOSITIONS USED (%)

Coke.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.	Water.	Ash.	Carbonaceous matter.
Westphalia 1	82.5	0.7	2.7	1.4	0.9	1.8	10.0	90.8
Westphalia 2	80.7	0.9	2.3	1.4	1.2	2.3	11.3	86.5
Saar ..	82.9	1.0	1.6	1.0	1.4	1.8	10.3	87.9
Silesia ..	86.4	0.5	0.8	1.2	1.0	3.7	6.4	89.9
English ..	80.7	0.8	2.9	1.5	1.1	1.7	11.3	86.9

Methods of Examination

The calorific value figures are only arbitary, as there are so many variables present in copper-smelting reactions, apart from the manner of charging the coke. There are many small practical tests for coke, such as noting whether it floats or sinks when charged into water, and examining its reducing properties by fusion with litharge, etc., but all of these depend on the kind of blast-furnace smelting employed. Where the smelting operations have been retarded, a type of waste coke is formed known as "copper-cokes," which consists of coke saturated with lead and copper. This material is put through the full examination given to fresh coke consignments, so that both the metal values and heating value are fully utilised. As the speed with which copper can be smelted depends so largely on the composition, quality, and space occupied by coke, all foreign cokes which may have been improved are kept under close scrutiny with a view to drawing comparisons in working costs. There are, of course, many other points relating to the best methods of handling coke in the copper blast furnace, but these have been published elsewhere and need not be repeated.

U.S.A. Magnesium Industry in 1939

Increased Use in Aircraft

PRIMARY magnesium production (sales) in the United States during 1939 was the largest in history and more than double that of 1938, according to the Bureau of Mines, United States Department of the Interior. Sales of new magnesium ingot totalled 10,650,121 lb. in 1939, an increase of 121 per cent. over that of 1938, and more than the combined sales in 1937 and 1938. The large increase in demand is attributed to consumption by the domestic aircraft industry. On account of national preparation for defence and the wars abroad, the aeroplane and aircraft engine manufacturing industries expanded their production facilities rapidly during 1939 and at the end of the year had a capacity for producing more than 15,000 planes annually. The aircraft production capacity of the United States is expected to reach 2000 planes monthly in 1940, and thus the magnesium industry anticipates an even greater domestic consumption of metal. A part of the magnesium sold and used in 1939 was withdrawn from producers' stocks and a substantial portion of the sales consist of exports, chiefly to the United Kingdom. In order to supply the increasing demand for magnesium metal, the Dow Chemical Co., the sole domestic producer, extended its production capacity at Midland, Michigan, and in March, 1940, announced the construction of a $5,000,000 plant at Freeport, Texas, which will double the company's capacity. The electrolytic plant at Midland utilises magnesium chloride derived from underground brine, but the new Texas plant will obtain magnesium chloride from sea water. The company reduced the nominal price on 99.8 per cent. ingot magnesium from 30 cents per lb. (prevailing since 1931) to 28 cents in March, 1939, and to 27 cents in August, 1939.

Non-Structural Uses

Total manufactures of structural and non-structural products of magnesium metal and magnesium-rich alloys increased 77 per cent. in 1939 over 1938. Most of the increase was accounted for by structural products, the sales of which increased 84 per cent. over those of 1938. The use of non-structural products for use in pyrotechnics and the electrical and chemical industries increased 26 per cent. Data are not available on the domestic consumption of magnesium in other important fields, but it is reasonable to believe that there was a large increase in the use of magnesium as a deoxidiser in the metallurgical industry and as a component in aluminium and other alloys.

Of unusual interest in the markets for fabricated magnesium products in 1939 was the 434 per cent. increase in the sale and use of alloy ingot, used largely as a material of construction. Castings accounted for 78 per cent. of the total structural products sold or used, of which 72 per cent. were sand and permanent mould castings (chiefly the former) and the remainder die castings. Comparable data on the manufacture of sand, die, and permanent mould castings are not available for previous years, but it is known that the production of high pressure die castings has advanced greatly in recent years. In 1939 sales of sheet gained 45 per cent.; structural shapes, rods, and tubing, 285 per cent.; and forgings, 188 per cent.

Aeroplane Parts

The greatly increased use of magnesium in the aircraft industry during 1939 reflected not only the enlarged aircraft production, but also the fact that magnesium is being employed in many more aeroplane parts. The year witnessed the first production in the United States of magnesium alloy sheet for interior cabin parts of aeroplane transports. Sheets, bars, extrusions, etc., were fabricated by riveting or electric spot welding into such fuselage assemblies as doors, hatches, floors, seats, instrument assembly panels, screw machine parts, stiffeners, baggage compartments, partitions, air ducts, etc. Sheets and extrusions also were used experimentally in wing sections. The largest consumption of magnesium alloy, however, was in the form of castings, chiefly sand castings. Sand castings were used for control columns, fuel valve mountings, engine control brackets, rudder pedals, carburettor air scoops, blower sections, thrust bearing and camshaft housings, rear sections, diffuser plates, landing and tail wheels, engine starter parts, pump bodies, and for many other major and accessory parts of aircraft engines. Die castings were used for rocker box covers, valve rod guides, rib slats, filler blocks, seat castings, and other small parts. Forgings were used for highly stressed parts such as gear housings and diaphragms and magnesium tubing was introduced in aircraft construction, especially for electrical conduit systems.

Iron and Steel Control

New Control Prices

THE Minister of Supply has made the Control of Iron and Steel (No. 10) Order, coming into force on July 1, and varying the Control of Iron and Steel (No. 8) Order made on April 4 last. The new Order substitutes a fresh schedule of maximum prices for iron and steel products. The new prices represent additions of from 3s. 6d. to 9s. per ton for pig-iron, 22s. 6d. to 27s. 6d. for billets, with corresponding adjustments for other products.

These advances are in the main to meet from a central fund further abnormal costs of imported materials under present conditions. They also include some allowance for the rises which have taken place in manufacturing costs since the outbreak of war, including recent increases in scrap prices and railway rates.

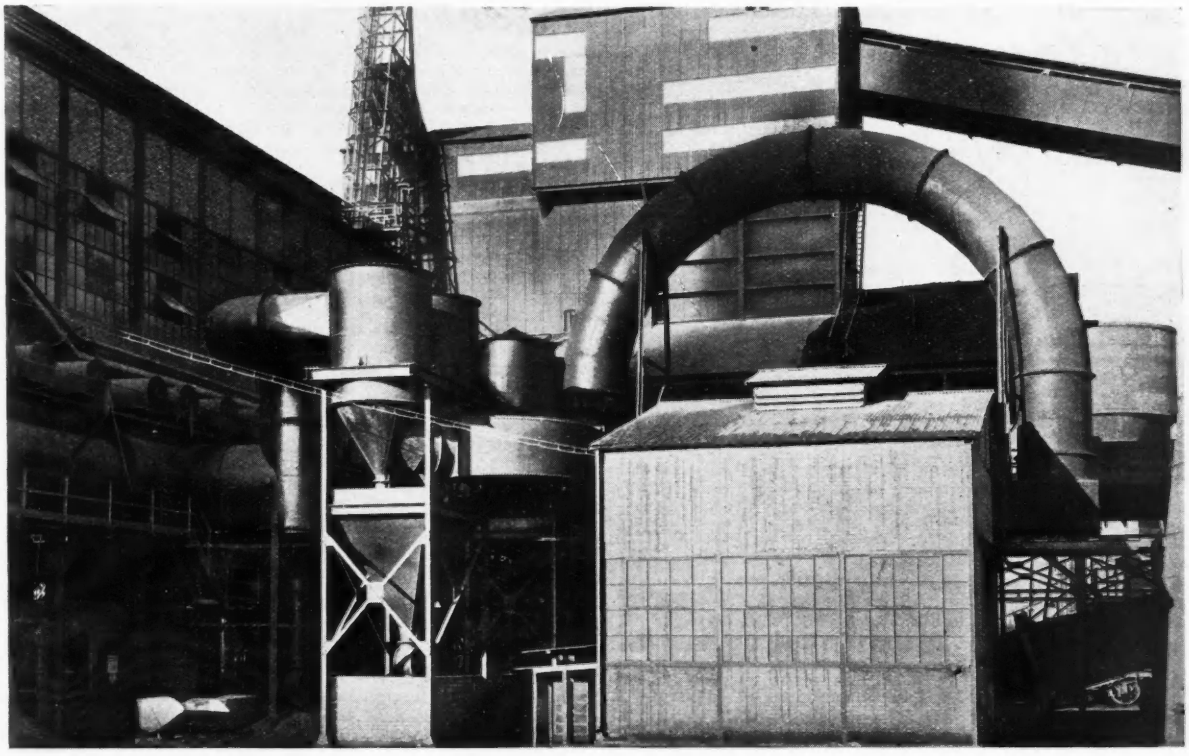
Scrap Metal

The Minister of Supply has made the Control of Iron and Steel (No. 9) (Scrap) Order, 1940, which revokes all existing acquisition licences under the Control of Iron and Steel (No. 7) (Scrap) Order, 1940, in so far as they apply to scrap iron ingot moulds and scrap iron ingot mould bottom plates. In addition, the Order provides that no person shall treat, use or consume scrap iron ingot moulds and bottom plates unless licensed to do so or otherwise authorised by the Minister of Supply. Finally, the Order fixes new maximum prices for scrap hematite iron ingot moulds and hematite bottom plates, ranging from £5 12s. 6d. to £6 2s. 6d. per ton.

U.S.A. MOLYBDENUM IN 1939

The upward trend in the production of molybdenum in the United States, which began in 1933, was arrested in 1939 with a decrease of 9 per cent. from 1938, according to the Bureau of Mines, Department of the Interior. Shipments, however, established high record, being 26 per cent. greater than in 1938 and 8 per cent. more than in the previous record year, 1937. Domestic production of molybdenum in 1939 amounted to 32,347 short tons of concentrates containing 30,324,000 lb. of metallic molybdenum, as compared with 36,157 tons of concentrates containing 33,297,000 lb. of metallic molybdenum in 1938. Exports of molybdenum concentrates in 1939 were 21,777 short tons, of which 9071 tons went to the U.S.S.R., 4681 to Japan, 3778 to the United Kingdom, 1480 to France, 1367 to the Netherlands, 502 to Italy, and 898 tons to other countries.

IT IS REPORTED from Bucharest that Rumanian copper ore production shows an important increase, being 25,108 tons last year, against 12,202 tons for 1938, and 1203 tons for 1937.



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New Control Orders

Molasses and Industrial Alcohol

THE Control of Molasses and Industrial Alcohol (No. 8) Order, 1940, made by the Ministry of Supply, which came into force on July 1, is a consolidating Order embodying the provisions of earlier Orders, which are now revoked. The provisions of earlier Orders relating to returns of stocks, etc., are not included in the present Order, as the position is covered generally by the Industry (Records and Information) (No. 1) Order, 1940. By the present Order, the provisions relating to control of sales by licence are extended to acetic anhydride. Maximum prices are also fixed for sales of acetic anhydride, varying from 8d. per lb. in respect of deliveries of 5 tons or over in returnable containers, to 11d. per lb. for deliveries of one standard carboy or over, but less than 5 cwts. including the cost of the container.

Fertiliser Prices

The Minister of Supply has issued a Direction (No. 4) under the Control of Fertilisers (No. 1) Order, 1939, fixing the maximum prices of certain fertilisers for the months of July, August and September. The price of superphosphate of lime may be advanced by not more than 5s. 6d. a ton over the Spring 1940 price, and of ground phosphate by 3s. In the case of compounds equivalent increases are permitted in the prices of the phosphoric acid content, but the additions in respect of bags and general charges remain unchanged. The other elements in the prices of compounds, that is the charges for potash and sulphate of ammonia, have been increased proportionately to the higher prices of these materials.

Where delivery of any of the fertilisers covered by the above Order is taken during the month of August a rebate of 1s. 6d. per ton is allowed, and during the month of July the rebate is 3s. per ton.

Exemption from K.I.D.

The Treasury has made two Orders under Section 10 (5) of the Finance Act, 1926, as amended by Section 2 (1) of the Import Duties (Emergency Provisions) Act, 1939.

The Safeguarding of Industries (Exemption) No. 9 Order, 1940, continues the exemption from Key Industry Duty of the articles specified in the attached lists A and B until December 31, 1940, and September 30, 1940, respectively.

The Safeguarding of Industries (Exemption) No. 10 Order, 1940, exempts diethyl amino-ethanol and trichlorethylene from Key Industry duty from July 1 until December 31, 1940.

LIST A.

Fermentographs, being instruments for measuring and recording carbon dioxide evolved during dough fermentation; Integrators (planimeter type).

Sealed cylindrical X-ray tubes having four windows.

Oxides of rare earth metals.

Vanadium-silica compounds specially prepared for use as catalysts for sulphuric acid manufacture.

Synthetic organic chemicals, analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes, the following: Acetamidosalol (acetylamido phenol salicylate); acid adipinic; acid dipropyl-malonic; acid filicic; acid maleic; acid phthalic anhydride; acid propionic; acyl derivatives of urea (acid isobutyl allyl barbituric, acid isopropyl barbituric, cyclohexenyl ethyl malonyl urea, N-methyl ethyl phenyl malonyl urea, sodium ethyl methyl butyl barbiturate); alcohol amido-ethyl; alcohol dodecyl; allyl paracetaminophenol; amido-guanidine sulphate; amidopyrin (dimethyl-amidoantipyrine); amidopyrin-barbitone; ammonium perchlorate; aniline; anisidine, ortho-; betain hydrochlorate; bromural (Dormigene); butyl methyl adipate; caesium bromide; chinoline (quinoline); chlor-nitro-benzol, ortho- and para-; cocaine, crude; cumenol pseudo-; cyclohexanol (methyl adipate); dial (acid diallyl barbituric); dicyandiamide; didial (ethyl morphine diallyl barbiturate); p-di-ethoxy ethenyl diphenyl amidine and its hydrochloride; diglyceryl tetra-acetate; dimethylamine; dinitro-orthocresol; diphenyl; diphenyl oxide; elbon (cinnamoyl para-oxyphenyl-urea); ethyl abietate; ethyl benzoyl-benzoate; ethylene bromide; eukodal; furfurol; germanium oxide; glycol ethers; kryofin; lead tetra-ethyl; lipoiodin; lithium fluoride crystals, not optically worked, weighing not less than 2.5 grams each; maleic anhydride; R. mannite (R. Mannitol); menthyl ethyl glycollate; N-(oxy-aceto-mercuric-propyl) - ethylurethane; metaldehyde; methyl amidoxybenzoate; methyl anthranilate; oxymethyl para-oxy-phenyl benzylamine methyl sulphate; methyl-sulphonal (diethyl-sulphonemethyl-ethylmethane, Trional); methylene chloride; α-naphthyl isothiocyanate; nickel hydroxide; sodium dioctyl sulpho-succinate; copper methyl arsenate; 4-oxy-3-ethylamino-phenyl arsinic acid N-methyl tetrahydropyridine B-carboxylic acid methyl ester; oxy-acetophenone, meta-; phenetidine, ortho-; phenetidyl-phenacetin and its hydrochloride; phenol (synthetic); decamethylene diguanidine dihydrochloride; dodecamethyl diguanidine hydrochloride; phloroglucine; phthalic anhydride; phytin; piperazine (diethylene-diamine, Dispermin); potassium ethyl xanthogenate (potassium xanthogenate); potassium guaiacol sulphonate; R. potassium hydroxide (R. potassium caustic, R. potassium hydrate); quinine ethyl-carbonate; salfrol; salol (phenyl salicylate); sodium phenyl dimethyl pryazolone amino-methane sulphonate; sulphonal; theophylline; trimethylamine; valeryl diethylamide; veratrine.

LIST B.

Barbitone (Veronal; Malonal; Malourea; acid diethyl-barbituric; diethyl malonylurea; Hypnogen; Deba).

Industrial Ammonia and Non-Ferrous Metals

Applications for import licences for nitrate of soda (otherwise known as sodium nitrate, whether Chilean or synthetic), sodium nitrite, calcium cyanamide, and calcium nitrate should be made (in duplicate) to the Ministry of Supply, Industrial Ammonia Control, 19 Berkeley Square, Bristol, 8. Applications for licences for white metal alloys, precipitate and cement copper, ores and concentrates (other than bauxite and cryolite and ores and concentrates of antimony, chromium, iron, manganese, molybdenum, nickel, radium, tin, titanium, tungsten and zirconium) of non-precious metals, should be made (in duplicate) to the Non-Ferrous Metals Control, Ministry of Supply, Grand Hotel, 46 Albert Street, Rugby. Application forms may be obtained from the Import Licensing Department, 25 Southampton Buildings, London, W.C.2, or from the offices of H.M. Collectors of Customs and Excise. *The direction at the head of the application form that it should be forwarded to the Import Licensing Department should be ignored.*

British Chemical Prices

Market Reports

MARKET prices have remained steady throughout the past week and no change of importance falls to be recorded in any direction. Nominal values are ruling for a number of items and in one or two directions small parcels of available imported material are commanding a high figure. Regarding the volume of business transacted this has been on a fairly good scale with inquiry spread over most sections of the market. Formaldehyde and salammoniac are again moving well and attention is still concentrated on such items as acetic, tartaric and citric acids. Cream of tartar is also receiving a fair request. Difficulty in obtaining supplies is experienced in some directions, particularly amongst chlorates and perchlorates. A steady trade continues in most of the coal tar products and with the possible exception of pitch a firm tone is maintained throughout.

MANCHESTER.—Marked firmness continues to characterise virtually all sections of the Manchester chemical trade. Users of a wide range of heavy products for the cotton and woollen textile and allied trades are calling for good contract supplies and a fair amount of new inquiry has been reported during the past week. Substantial quantities are also moving into consumption in the rubber and other principal consuming trades. In the by-products market the future of pitch prices is uncertain in consequence of the developments in Continental markets, but in most other sections values are firm, and steady deliveries are being called for.

GLASGOW.—As expected, the demand in Scottish heavy chemicals trade continues to keep stocks moving at quite a brisk pace. Prices are being well maintained, and as values are usually based on demand, we do not foresee any slackening in the near future, in fact, an upward tendency is apparent.

Price Changes

Carbolic Acid.—MANCHESTER: Crystals, 10½d. per lb. d/d; crude 4s. to 4s. 3d., naked at works.

Cresylic Acid.—MANCHESTER: Pale, 99/100%, 2s. 8d.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

E. LODGE AND CO., LTD., Yarm-on-Tees, tallow refiners. (M., 6/7/40.) June 21, £100 debenture to E. Lodge, Stockton-on-Tees; general charge. *Nil. November 4, 1939.

METALLURGICAL INDUSTRIAL PROCESSES, LTD., London, E.C. (M., 6/7/40.) June 24, £600 debenture, to T. F. Howells, Ltd.; general charge.

PETROLEUM ENGINEERING AND TRADING CO., LTD., London, W. (M., 6/7/40.) June 24, agreements securing £200 and £200, to G. S. Coppen, London; charged on certain machines. *——. December 22, 1939.

Satisfactions

YORKSHIRE INDIGO SCARLET AND COLOUR DYERS, LTD., Leeds. (M.S., 6/7/40.) Satisfaction June 22, £750 part of amount outstanding July 1, 1908.

County Court Judgments

BELCHER, ROWLAND STANLEY, 61 Church Street, Birmingham, scientific instrument manufacturer. £26 1s. 3d. April 30.

Company News

Lansil, Ltd., manufacturers of cellulose acetate, have declared a final dividend on the ordinary shares of 3 per cent., making 6 per cent. for the year to March, 1940, compared with a total of 5 per cent. a year ago.

Yorkshire Copper Works, Ltd., report a profit for 1939, after depreciation, taxation and all other charges, of £135,290 (£120,804). An ordinary dividend of 10 per cent., less tax, has been declared, compared with 10 per cent., plus capital bonus of 10 per cent. last year. To special reserve, £15,000 (£10,000); to reserve against additional taxation, £24,000 (nil); to general reserve, £55,000 (£30,000); forward, £16,528 (£15,979, after transferring £20,000 to reserve for expenditure under Civil Defence Bill, and £7000 to pension reserve). The meeting will be held at Atlas Chambers, King Street, Leeds, on July 8, at 11.30 a.m.

Lever Brothers and Unilever, Ltd., report that the total profits for 1939 were over £1,000,000 higher at £8,360,910, against £7,316,343. This is after charging an unstated amount for E.P.T., and also after providing £1,379,657 for staff pensions. Amounts retained by subsidiary and allied concerns have increased by £906,591 and there is a rise of £597,289 to £1,389,337 in the amount charged for general administration expenses. The reserve for contingencies receives £800,000 against £100,000 a year ago. This leaves the carry-forward £226,467 higher at £1,716,849. Combined sales of all commodities sold to the public during 1939 amounted to £97,500,000, an increase of 3 per cent. as compared with 1938. The meeting is at Unilever House, Blackfriars, London, E.C., on July 11 at 11 a.m.

Chemical and Allied Stocks and Shares

GENERAL recognition that the decline in industrial securities had reduced share values to unduly low levels has induced a small improvement in demand and there has been a fairly widespread reversal of the trend on the Stock Exchange. The current belief is that recent market fears of ultra-conservative dividends, because of the possibility of air raid damage to factories and works, were much exaggerated, but it is recognised that the dominating market factor will be the nature of the war news, and that share values will probably continue to move sharply from time to time. Sentiment has benefited this week from the excellent demand announced for National War Bonds.

As compared with a week ago Imperial Chemical have been marked up from 19s. 4½d. to 23s. 4½d., while the preference shares, which were no better than 24s. 3d. last week, have since moved strongly to 27s. 6d. Moreover, Dunlop Rubber were 3s. 6d. higher at 23s. 6d., and Borax Consolidated rallied from 18s. 9d. to 22s. 6d. Lever and Unilever responded to the increased profits for the past year, and at 21s. 3d. show a rise of 6s. 3d. on balance. Lever and Unilever preference units also moved in favour of holders, while British Oil and Cake Mills were 31s. 10½d., compared with 30s. a week ago. Cerebos and Reckitt and Sons' shares participated in the better market tendency, but Triplex Glass remained dull and were no higher than 16s. 3d., there being divergent market estimates in respect of the dividend for the financial year ended last month. United Glass Bottle were firmly held, but at 43s. 9d. were unchanged on balance.

Distillers moved up strongly to 55s. 9d. which compares with 47s. 6d. a week ago; the dividend was in accordance with best market anticipations. United Molasses were 1s. 3d. better at 17s. 6d., while Wall Paper Manufacturers deferred units put on 2s. 6d. to 12s. 6d. Moreover, Pinchin Johnson gained 1s. 1½d. to 15s. 6d. Textile securities were better, with Courtaulds 25s. 6d. on more encouraging estimates of the forthcoming interim dividend, while an improved price ruled for British Celanese second preference. Monsanto Chemicals 5½ per cent. preference shares remained at 21s. 3d.; the interim dividend on the ordinary shares falls to be declared shortly. The report of Low Temperature Carbonisation is also due this month; the 2s. shares continued to be quoted around 1s. Blythe Colour remained at 7s. 6d. awaiting the interim dividend announcement, and Cellon and Imperial Smelting were also unchanged at 13s. 9d. and 6s. 3d. respectively.

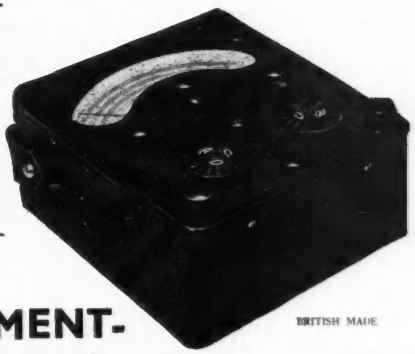
Stewarts and Lloyds were higher at 31s. 9d., and there was a general rally in other iron and steel securities following their recent heavy decline. Staveley were 37s. 6d., and Dorman Long 15s. 6d., while Tube Investments were marked up to 63s. 9d. Associated Cement and British Plaster Board improved. Elsewhere, Barry and Staines appreciated from 17s. 6d. to 22s. 6d. In other directions, Boots Drug recovered strongly to 33s. 3d., while Sangers were firm at 17s. on satisfaction with the dividend. Timothy Whites were also around 17s., while Beechams Pills 2s. 6d. deferred were slightly higher at 7s. 3d. General Refractories, however, were dull at 6s. 6d., and British Match remained at 25s. British Oxygen, Turner and Newall, Murex and other widely-held shares participated in the market rally, but, as in most other directions, best prices touched were not fully held. Oil shares recovered part of their recent sharp declines, and Anglo-Iranian were 33s. 9d., while Burmah Oil at 44s. 4½d. also showed a substantial rally on balance.

Chemical Trade Inquiries

Brazil.—An agent established at Rio de Janeiro wishes to obtain the representation, on a commission basis, of United Kingdom exporters of chemicals. (Ref. No. 412.)

United States of America.—A well-established firm of importers at Los Angeles wishes to be placed in touch with United Kingdom exporters of foundry coke (large, hard structure) and sulphate of ammonia. (Ref. No. 418.)

Current, A.C. and D.C. (0 to 10 amps.)
Voltage, A.C. and D.C. (0 to 1,000 volts)
Resistance (up to 40 megohms)
Capacity (0 to 20 mfds.)
Audio-frequency Power Output (0 to 4 watts)
Decibels (— 10 Db. to + 15 Db).



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Horizontal Vacuum RECTIFICATION STILL; 7 ft. 0 in. long by 5 ft. 0 in. dia., arranged for oil firing, with rectification column 12 in. dia. by 26 ft. 0 in. high, in 24 sections, swan neck to steel coil condenser in steel tank 3 ft. 0 in. dia. by 5 ft. 0 in. deep. Complete with usual fittings, etc.
Enamel Lined Cast Iron Steam Jacketed SULPHONATING STILL; 4 ft. 10 in. dia. by 5 ft. 3 in. deep, dished bottom, arranged with 10 in. by 8 in. raised flanged connection with bolted on cover and one 6 in. dia. ditto. Mounted on three cast iron legs, with circular lead coil condenser.
TWO AVAILABLE.
Vertical Jacketed Caustic Soda COOLING VESSEL, 4 ft. 3 in. dia. by 6 ft. 6 in. deep conical bottom, fitted with manhole, gauge, sight glasses, outlet valves and connections. Mounted on three cast iron legs. TWO AVAILABLE.
Horizontal Cylindrical MIXER, by Brinjes and Goodwin, 24 in. long by 2 ft. 6 in. dia., fitted with horizontal agitating shaft arranged with four cast iron blades, driven through gearing from fast and loose pulleys, pan has square discharge 6 in. by 4 in.
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'Phone 98 Staines.

25 GALLON Copper Jacketed Pan: Dehne Press, 30 Chambers, 26 in. square: Brass Lined Z Blade Mixer, 40 gallons: 250 Kilo Scales: Jacketed Churn, 150 gallons.
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WORKING NOTICES

THE Owners of Patent No. 412,790 are desirous of arranging by way of Licence or otherwise on reasonable terms for the commercial development in Great Britain of this invention which concerns "IMPROVEMENTS IN OR RELATING TO TANNING."—For particulars address Elkington and Fife, 20 to 23 Holborn, London, E.C.1.